CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

1. A frequency hopping time division duplex indoor wireless communication system comprising:

a base station having a processor and a first frequency selection unit for finding a current frequency on which to transmit and receive during a current time slot and at least a second frequency selection unit interfaced with said processor to select frequencies to be used in future time slots; and

a plurality of mobile stations communicating with said base station.

2. The communication system recited in claim 1, wherein the first and second frequency selection units comprise combinatorial logic units to perform frequency hop selection according to predetermined standards.

3. The communication system recited in claim 1, wherein the processor in the master unit interfaced to the second frequency selection unit cooperate such that a frequency corresponding to any time slots can be obtained by the processor by providing binary information about a pico-cell related address bits and clock bits corresponding to the time slot.

4. The communication system recited in claim 3, wherein the processor obtains frequencies corresponding to future time slots by sequentially providing the different clock bits corresponding to different time slots.

5. A frequency hopping indoor wireless communication system comprising:

a master unit and a plurality of slave units;

said master unit having a plurality of link state counters $C(i,j)$, wherein the states of wireless links between the master unit and a slave unit are recorded in link state counters provided one for each frequency of communication f_j between the master and the slave "i".

6. The frequency hopping indoor wireless communication system recited in claim 5, wherein

(a) the link state counters are initially reset to zero,

(b) a counter $C(i,j)$ is incremented by one when the master unit finds that a current transmission/reception with reference to slave unit "i" on frequency f_j failed, and

(c) the counter $C(i,j)$ is reset to zero when the current transmission/reception with reference to slave unit "i" on frequency f_j is successful or when the count value exceeds a reset threshold T_{RESET}.

7. The frequency hopping indoor wireless communication scheme recited in claim 6, wherein

(a) a transmission attempt is made to slave unit "i" on frequency f_j if a value of the counter $C(i,j)$ is less than or equal to a threshold $T_{TRANSMIT}$, and

(b) no transmission attempt is made to slave unit "i" on frequency f_j if the value of the counter $C(i,j)$ is greater than the threshold $T_{TRANSMIT}$, and the counter $C(i,j)$ is incremented by one.

8. A frequency hopping time division duplex master-slave indoor wireless communication system comprising:

a master unit having a processor and a first frequency selection unit for finding a current frequency on which to transmit and receive during a current time slot and at least a second frequency selection unit interfaced with said processor to select frequencies to be used in future time slots; and

a plurality of slave units communicating with said master unit, said master unit having a plurality of link state history counters $C(i,j)$, wherein the states of wireless links between the master unit and a slave unit are recorded in link state counters provided one for each frequency of communication f_j between the master and the slave "i", wherein

(a) before transmission to a slave unit, the master unit obtains the frequencies corresponding to time slots which will be encountered in the immediate future,

(b) if the link state history counter for a scheduled slave unit at an expected transmission frequency indicates that a transmission attempt can be made, the master unit proceeds to transmit to the slave unit at an appropriate packet size,

(c) the master unit tries to choose another active slave unit, if any, for transmission if the link state history counter for the scheduled slave forbids transmission,

(d) the master unit records the loss and gain of service by the slave units when transmission to slave units takes place in an order different from the regular scheduling order, and

(e) if the link state history counter values of all active slave units are above a threshold $T_{TRANSMIT}$, the master unit chooses a slave unit whose link state history counter has the lowest value, and decides on a packet size of one.

9. The frequency hopping time division duplex master-slave indoor wireless

communication system recited in claim 8, wherein

(f) after a slave unit for transmission is chosen by the master unit based on a link state history corresponding to a frequency to be used in a first time slot after a last time slot used by a current slave unit, the master unit checks for transmission worthiness for the slave at the frequency corresponding to an n-th time slot for transmitting an $(n-1)$ size packet, and chooses the highest packet size corresponding to which the link state history counter value is less than or equal to a threshold $T_{TRANSMIT}$, and

(g) if all frequencies corresponding different allowed packet sizes are such that the corresponding link state history counter values are above the threshold $T_{TRANSMIT}$, the master unit proceeds to choose another slave unit for transmission.

10. A frequency hopping time division duplex master-slave indoor wireless communication system comprising:

a master unit and a plurality of slave units, wherein

(a) every active slave unit monitors packet transmissions from the master unit and records the number of successful receptions by using goodness counters GC(i,j) for every slave unit "i" with reference to frequency f_j,

(b) a slave unit increments a goodness counter GC(i,j) when a packet transmitted by the slave unit on frequency f_j is successfully acknowledged by the master unit,

(c) short-term link history is maintained by periodic transfer of goodness counter values from active slave units to the master unit,

(d) the master unit constructs a link state history table of counters after receiving values of goodness counters GC(i,j) from all the slave units

and uses this information during a next scheduling period,

(e) goodness counters $GC(i,j)$ are reset to zero by slave units after successfully transmitting their values to the master unit, and

(f) the goodness counters $GC(i,j)$ are allowed to count up to the maximum value and stay there until reset.

11. The indoor wireless communication system recited in claim 10, wherein

(g) from among the currently active slave units, a first slave unit for which a value of goodness counter $GC(i,j)$ for the frequency of transmission f_j is greater than or equal to a minimum goodness threshold value T_{GOOD} is chosen for communication starting from a next transmission time slot of the master unit,

(h) if, however, none of the slave units' goodness counter values is greater than or equal to the threshold value T_{GOOD}, the master unit chooses a slave unit with a highest value of the goodness counter and decides on a packet size of one,

(i) after the slave unit for transmission is chosen by the master unit based on goodness counter values, the master unit checks for transmission worthiness for the slave unit at the frequency corresponding to an n-th time slot for transmitting an $(n-1)$ size packet, and chooses a highest packet size corresponding to which a goodness counter value is greater than or equal to the threshold T_{GOOD}, and

(j) if all frequencies corresponding different allowed packet sizes are such that the corresponding goodness counter values are below the threshold T_{GOOD}, the master unit proceeds to choose another slave unit for transmission.

12. A frequency hopping time division duplex master-slave indoor wireless communication system comprising:

a master unit and a plurality of slave units, wherein

(a) a second level frequency look-ahead is performed by the master unit even before a packet from an addressed slave unit is received, and

(b) the second level look-ahead is performed by the master unit to determine the slave units and packet sizes to be used next corresponding to the different sizes of packet that might be transmitted by an addressed slave unit.

13. A frequency hopping time division duplex master-slave indoor wireless communication system comprising a master unit and a plurality of slave units, wherein the master unit chooses a packet size to be transmitted to a slave unit from a multiplicity of packet sizes to mask any expected interference in a second through a last time slot occupied by the packet.

14. A frequency hopping time division duplex master-slave indoor wireless communication system comprising a master unit and a plurality of slave units, wherein the master unit maintains an expected state of wireless links with reference to interference by using a table of counters whose values indicate goodness of the links.